

21U116S

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Name:

Reg. No:

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CUCBCSS-UG)

CC15U PH1 B01 - METHODOLOGY OF SCIENCE AND PHYSICS

(Physics - Core Course)

(2016 to 2018 Admissions – Supplementary)

Time: Three Hours

Maximum: 80 Marks

Section A

Answer *all* questions. Each question carries 1 mark.

1. Author of Principia Mathematica is
2. A vector divided by its magnitude is vector.
3. The Michelson Morley experiment disapproved the hypothesis.
4. Sum of the diagonal elements of a matrix is
5. Knowledge obtained by deductive reasoning is called
6. Stokes theorem gives the relation between integral and integral.
7. Heliocentric theory was proposed by
8. is the ability for different thought processes such as analogy, induction, deduction and intuition.
9. Laser works on the principle of
10. If A is an orthogonal matrix, then $\det A$ is.

(10 × 1 = 10 Marks)

Section B

Answer *all* questions. Each question carries 2 marks.

11. What is hypothesis?
12. What is meant by pseudoscience? Give an example.
13. State the postulates of special theory of relativity.
14. What is Photoelectric effect?
15. State and explain Stokes theorem
16. Write a short note on metastable state.
17. Define vector triple product and write down an expression for it.

(7 × 2 = 14 Marks)

Section C

Answer any *five* questions. Each question carries 4 marks.

18. What is De Broglies hypothesis?
19. What is twin paradox?

20. Discuss the importance of peer review.
21. What is meant by induced absorption, spontaneous emission and stimulated emission
22. What is meant by auxiliary and adhoc hypothesis?
23. What is LASER? Explain its properties and applications.
24. Using spherical polar co-ordinates find the volume of sphere.

(5 × 4 = 20 Marks)

Section D

Answer any *four* questions. Each question carries 4 marks.

25. Solve the system of equations using Cramers rule.

$$4x + 2y + z = -8$$

$$3x - y + 2z = 4$$

$$-x - y - z = 2$$

26. Check the divergence theorem using the function $\vec{B} = y^2\hat{i} + (2xy + z^2)\hat{j} + (2xy)\hat{k}$ and the unit cube situated at the origin.

27. Find the inverse of the matrix $\begin{bmatrix} 0 & -1 & 3 \\ 4 & 2 & -2 \\ 1 & 1 & 1 \end{bmatrix}$

28. Discuss on the topic of revolutions in science and technology.
29. Discuss different methods in scientific inquiry.
30. What is black body radiation and Ultraviolet catastrophe?
31. Calculate the Laplacian of the following function. $\phi = x^2 + 2xy + 3z + 4$

(4 × 4 = 16 Marks)

Section E (Essays)

Answer any *two* questions. Each question carries 10 marks.

32. What are the postulates of special theory of relativity? Discuss in detail
 - (a) Length contraction
 - (b) Time dilation
33. Discuss the cylindrical curvilinear coordinate system.
34. What is hypothesis? Discuss the various aspects and steps in formulation of hypothesis scientific method.
35. Write an essay on the development of Quantum Mechanics.

(2 × 10 = 20 Marks)
